

the last square being almost opaque, and representing twenty-five thicknesses of tissue paper. The exposure in every case was ten seconds; the distance of the film from one light or lights always 14 feet, and the number of cells 30. The development was confined to two minutes exactly, an oxalate developer of normal strength being employed¹:—

Result of First Experiment

	No. of square through which the light penetrated.
Group of four lamps (Nos. 1, 2, 3, 4) ...	13
„ three „ (Nos. 2, 3, 4) ...	15
„ two „ (Nos. 3, 4) ...	19
„ one lamp (No. 4, low resistance) ...	23
„ „ (No. 3, high resistance) ...	20

As it was a matter of difficulty to judge the exact square or number printed through, the mean results of three observers or readers was taken. So that the development should be the same throughout, all plates were developed simultaneously in the same dish.

The result may not permit us to estimate with scientific accuracy the value of the lights under the above conditions, but it proves practically (1) that the amount of light given off by four lamps is less than that given by three, and that the electricity is employed most economically for lighting when only one lamp is used; and (2) that, at any rate in the conditions described, a comparatively low-resistance lamp gives more light than a comparatively high one.

In my second experiment I estimated the actinic power of single lamps, when one or more were in circuit, the photographic arrangements being the same.

Result of Second Experiment

	No. of square through which the light penetrated.
One lamp, No. 4 (only one in circuit) ...	23
One lamp, No. 4 (two in circuit) ...	18
One lamp, No. 4 (three in circuit) ...	14
One lamp, No. 4 (four in circuit) ...	9
Arc light (with 30 cells) ...	upwards of 25
Ordinary fish-tail burner (burning 5 cubic feet per hour) ...	7

The result here is interesting in showing the comparative strength of the lamps by themselves, and to what extent the light, so to speak, is “turned down” by bringing another lamp into circuit. As my screen was only graduated as far as 25, it was impossible to estimate the comparative value of the arc light, for it went above this degree, while a low-resistance Swan lamp only goes as far as 23. This last lamp, No. 4 in the series, was the one always tested, and therefore the results shown may be considered the most favourable. The result given by a good fish-tail burner permits us to make some comparison between gas and the Swan light at a minimum.

It says something for the skill with which the sensitive gelatino-bromide is prepared commercially nowadays, when we find it is so uniformly sensitive that in the two trials (where square 23 is recorded) there should be so unanimous a result.

November 12

H. BADEN PRITCHARD

Sound-producing Ants

REFERRING to Mr. Blanford's letter in NATURE, vol. xxv. p. 32; whilst lying awake early one morning before the servants were stirring, when camped in the Deccan at the present small station of Chota or Chick-Soogoor, on the G.I.P. Railway, during the winter of 1868-69, I heard a sound, as Mr. Blanford suggests, repeated at regular intervals of about a second. It sounded as though the wall of the tent was being struck by a light fringe along one side; but noticing that the air was perfectly still, I listened for some minutes, wondering what it was and trying to fix the locality. I got out of bed cautiously and looked out; the whole of one side of the tent for a height of two feet was covered with white ants so thickly that at the first glance I thought the wall was covered with a grey-reddish mud to this height. I was trying to make out how the sound could be produced, when it stopped suddenly, the ants evidently having become aware of my presence; they then began to clear off the wall rapidly, and in a few moments it had become white again. They had not attacked the cotton wall. On looking at

¹ Developer:—

Saturated solution of oxalate of potash ...	3 parts.
Saturated solution of proto-sulphate of iron ...	1 part.

the ground round the tent I found their runs extending from a tamarind tope, the nearest trees of which were about 50 feet away. The runs were built in the usual way of red Deccan soil, there were great numbers of them, varying in width from the thickness of twine to 2½ inches, often crossing each other diagonally. No doubt the ants had found the tent in the evening, and were prepared to make a morning meal of a portion of it, when I disturbed them on looking out. The impression on my mind at the time was that the whole body of ants struck the tent wall at the same time with their heads, and that it was very extraordinary that they all stopped at once; there were no dropping shots, it was an instantaneous cessation along the whole line. The tent, which was a double one, was at least 30 feet long, and the ants possibly extended round the ends.

JOHN FOTHERINGHAM

13, Springfield Road, N.W., November 12

UNIVERSITY COLLEGE, LONDON.—The Calendar will give you all the information you want.

“FIFTY YEARS' WORK OF THE GEOGRAPHICAL SOCIETY.”—We believe Mr. Markham's narrative may be ordered through any bookseller. The Polar Observing Station at Lady Franklin Bay was really occupied by a United States party in the past summer, with the intention of carrying on observations for at least a year.

SEALS IN LAKE BAIKAL.—Mr. Edward Fry refers Mr. Keane to Bell's “British Quadrupeds,” 2nd edit. p. 248, where he will find that Herr Radde figures and describes the seal of Lake Baikal in his “Reise im Süden von Ost-Sibirien”; and to Murray's “Geographical Distribution of Mammals,” p. 126. Mr. Thomas Ward sends the following references:—Myer's “Geography, vol. ii. p. 9, edition 1829; Erman's “Travels in Siberia,” vol. ii. p. 200 (Cooley's translation); “English Cyclopædia” (Article Baikal). From this last Mr. Ward quotes as follows:—“The existence of the salmon, of the seal, and of a kind of sponge in the fresh water of the Baikal has given rise to many speculations among naturalists. Pallas and Georgi are unable to explain this phenomenon otherwise than on the supposition that the Lake of Baikal at some remote period formed a part of the Northern Ocean, . . . or on another supposition, that these animals were transported into the lake by some excessive inundation of the Lena River, whose sources are not far from its western borders.”

HEADS AND HATS

WE have received the following further communications on this subject:—

HAVING last March laid the subject referred to by your correspondents, Messrs. Kesteven and Hyde Clarke, before the Bristol Naturalists' Society in a short paper, I venture to offer a *résumé* of the facts collected by my friend Dr. Beddoe and myself, which seem to justify the conclusion that a diminished size of hat is now required by young men as compared with those used by the same classes twenty to twenty-five years ago. (1) I have from time to time during the last three or four years had my attention called to this alleged change by Mr. R. Castle, hatter and hosier of 1, St. Augustine's Parade, Bristol, who, in proof of it, has frequently shown me hats of small size, such as are now generally required by both gentlemen and servants between the ages of twenty and thirty. He states that these smaller hats, which used to constitute only a small percentage of his stock, now form the bulk of it, whilst those which formerly suited the larger proportion of his customers are now usually required only by the older ones amongst them. Mr. Castle estimates the difference as amounting to at least one whole size, which is equivalent to three-eighths of an inch in circumference, and he has furnished me with typical extracts from his order book to Messrs. Lincoln and Bennett in fuller proof of his assertion. I have arranged and reduced his figures in the accompanying table, and the result does undoubtedly seem to be that the buyers of 1875-80 are taking a hat at least one size smaller than the same class (not necessarily the same individuals) used to do twenty to twenty-five years previously. (2) My friend Dr. Beddoe, whose attention I called to the subject last year, informed me that Mr. C. Garlick, hat manufacturer of 87, Castle Street, Bristol, furnished him with the sizes of 200 hats sold by him in 1862, and the average is precisely 7; one of the lots yielding 7'01 and the other 6'99. Two

Orders for Hats from Messrs. Lincoln and Bennett in 1855,
1875, 1878, and 1881

Sizes.	6½	6¾	6⅝	6¾	7	7½	7¾	7⅝	7¾	Total	Ave.	Remarks.
Circumference.	20½ in.	20¾	21	21½	22	22½	22¾	23	23½	No.	Size.	
1855	1	2	4	4	4	4	2	1	22	7½	7½	Average shrinkage about ¼ (or 4), or rather more than one size, which amounts to ½. Circumference of head diminished by nearly ½ an inch.
"			4	3	3	2			12	7½		
1875		2	4	6	6	4	2		24	6¾	6¾	
"		1	3	2	3	2	1		12	6¾		
1878		1	3	8	4	6	2		24	6¾	6¾	These are all livery hats and are excluded from the averages.
"		1	3	3	3	1	1		12	6¾		
1880		1	4	4	2	1			12	6¾		
"		1	6	3	6	5	2	1	24	6¾		

lots of 100 each sold by him in 1880 averaged respectively 6·89 and 6·92, or a mean of 6·905. Thus the shrinkage since 1862 appears to be about 0·1 of the technical scale usually employed by the trade, of which 0·125 (½) represent a difference of one size, but a difference in the circumference of the head of ⅜ ins (= 0·375) of an inch. Therefore the above 0·1 deduced by Dr. Beddoe from Mr. Garlick's figures represents a shrinkage in circumference of over ⅜ of an inch, which agrees pretty closely with my previous result of "nearly ½ an inch" from Mr. Castle's data. (3) While in Scotland during the summer of 1880, Dr. Beddoe learned from the principal hatter in Glasgow that his experience fully corroborated what has been stated, so that the diminution appears not to be confined to the southern portion of the kingdom. (4) Mr. Mordey, hat manufacturer, of 159, Blackfriars Road, London, wrote me on February 22 as follows:—"In answer to your inquiry I beg to say that my experience tells me that men's heads have decreased in size during the last twenty years. Twenty years ago the circumference of men's heads ran from 21¼ to 23½ inches. At the present time the size is from 21 to 22½—mostly 21 to 22½. This decrease is so general that we do not make big sized hats for stock, but only as ordered, and very few then." (5) Another hat manufacturer writes:—"Fifteen years ago the usual sizes of hats in England were from 6¾ to 7¾, and even 7½ was not uncommon. But now if a 7¾ hat were wanted we should have to make a block purposely." This may be sufficient evidence to show the probable accuracy of those who assert the fact of shrinkage in the size of hats, and it only remains to add a few words as to the possible cause. To the somewhat obvious suggestion that the practice of wearing the hair more closely cropped might account for the difference, Mr. Castle, as a practical hatter, replies that the effect of this would be scarcely perceptible, and further urges that the less the head is protected by a cushion of hair, the easier must be the fit of the hat, to prevent friction and ensure comfort. The same view is taken by the manufacturer quoted in paragraph (5), who writes, "this solution of the matter is inadmissible." Another suggestion is that the mode of wearing hats has changed, and the present style admits of a smaller size. On this point Mr. J. C. Withers, hat manufacturer, of 80 and 81, Castle Street, Bristol, who has been in the trade upwards of thirty years, writes as follows:—"I am well aware that the size has considerably decreased within the last twenty to twenty-five years, but I attribute this entirely to the manner in which they are now worn, which is far more forward on the head than formerly. If I were to wear my hat as my grandfather did I should take one quite a size larger. When I was first at the trade I well remember that all hats had a cloth patch sewn on the under side of the brim at the back for the purpose of taking the friction off the coat collar, and thirty-five years ago we never made a hat without one." This explanation, I confess, sounds plausible; but though I well remember the cloth patch, so far as my memory serves it scarcely seems to me that the mode of wearing the hat has sufficiently changed within the interval (fifteen to twenty-five years) stated by the various authorities quoted to be adopted as offering a solution of the problem. In *Public Opinion* for May 28, 1881, is a letter on the subject signed "F. J.," which concludes thus: "This really does not account for the change, as hatters can testify. Twenty-five years have made little difference in the way of wearing hats, and it is during the last twenty-five years that the change has taken place." By Dr. Beddoe's kind permission I am enabled to add a curious list of the sizes of hats worn by

several eminent men, which was sent to him by Mr. Garlick, who obtained it from a friend in London:—

Lord Chelmsford ...	6½ full.	Earl Russell ...	7½
Dean Stanley ...	6¾	Lord Macaulay ...	7¾
Lord Beaconsfield ...	7	Mr. Gladstone ...	7¾
H.R.H. the Prince of Wales ...	7 full.	Mr. Thackeray ...	7¾
Charles Dickens ...	7½	Louis Philippe ...	7¾
Lord Selborne ...	7½	M. Julien ¹ ...	7¾
John Bright ...	7½	Archbishop of York	8 full.

In conclusion, to quote the remarks on my paper of a writer in the *Bristol Daily Press*, "In future the familiar expression, borrowed from Milton, of an opponent 'hiding his diminished head,' will possess a special significance. Fuller alludes, in his dissertation on 'Natural Fools,' to persons whose heads are 'sometimes so little that there is no room for wit, and sometimes so long that there is no wit for so much room,' so that, possibly, a slight diminution in the cranium is not an unmixed evil. There is, at any rate, no marked deterioration in the mental faculties, so critics may still find themselves in the position of the rustics who gazed in wonder at Goldsmith's village parson—

"And still they gazed, and still the wonder grew,
How one small head could carry all he knew."

If the diminution of heads, as well as of hats, be established, does it imply a diminution of the amount of brain, or only of the size of the cranium? F. F. TUCKETT

Frenchay, near Bristol, November 12

I BELIEVE that hatters' measurements of the head can only be accepted as mere records of the change of fashion, and that they are of little anthropological value. Thirty years ago close cropping of the hair was confined almost entirely to soldiers, grooms, and prisoners, and it was popularly considered a badge of servitude, or worse; but now, thanks perhaps to the Volunteer movement, and to the discontinuance of hair-cutting as a punishment in prisons, the military style of wearing the hair is almost universal among young men; hence smaller hats are required now than formerly. I find that long and short hair make a difference in the circumference of some heads of nearly half an inch. Again, our nightcap-wearing fathers and grandfathers were very much concerned about the temperature of their heads and ears, and they were accustomed to press their hats well down to keep them warm. Now they are worn much higher on the head, as a glance into any old print-shop window will show. Travelling-caps, and caps worn by boys, were formerly provided with lappets to cover the ears, but these peculiarities have long since disappeared, and caps of an undress military character, or felt hats, stuck on the top of the head, have taken their place. Mr. Hyde Clarke, in his letter in your last week's issue (p. 32), says that he has observed that the ears are lower down now than formerly, and he thinks this a proof of degeneracy of race; but the ears only appear lower because the hats are higher on the heads, and in any case it could be no proof of degeneracy, because the lower the ear the bigger the brain. But the chief reason for the falling off in the dimensions of hats in the present day is the accession to the hat-wearing community of a very large number of small-headed persons, such as clerks and shopmen, who formerly did not wear hats at all; and, on the other hand, the defection of a large-headed class, the clergy, who have given up tall hats and taken to the use of soft felt ones. The only way hatters' measurements could be made available for anthropological purposes would be to examine the statistics of one class, say the professional, who have always worn hats, and then allow for the change of fashion in the hair and the position of the hat at the present day. If it is really the case that the heads of the present generation are smaller than those of the last, we must look for the cause, not in tight-lacing, but in the diminished size or the deformity of the female pelvis, for it is this which is the gauge of the heads of the people. Male infants are longer, heavier, and have longer heads than females, and at the time of birth a greater destruction of males takes place in consequence. In Europe the proportion of infants born alive is 105 males to 100 females; but if we include the stillbirths, the proportion of the sexes is 150 males to 100 females, showing that there is a sad loss of some of the finest physical and probably mental products of our race by the mere mechanical

¹ A most remarkable head, 7½ × 7½.

difficulties at the time of birth. There can be no doubt that rickety conditions of town children, and the sedentary or persistent standing occupations of young girls in shops, &c., will tend to distort the pelvis, and thus act injuriously on the race by reducing both the physical and mental standard of their children. With regard to the progressive degeneracy of our population referred to by Mr. Hyde Clarke, I think something more definite than personal recollections is required to prove it. We all know how we are daily compelled to recognise the fallacy of our earlier recollection. If we go down to a country town or village, which we knew well a few years ago, we find the houses smaller, the streets narrower, and the whole place shrunken in its proportions, and it would be the same with the inhabitants also if they had stood still as the inanimate objects have done around them. There can be no doubt that our large towns are, as it were, the graves of the physique of our race, but it is not because town life is so very injurious, but because the feeble, the halt, and the blind gravitate towards them in search of work suitable to their capacities. So far from admitting the degeneracy of our population as a whole, I am satisfied that it is improving in physique, and is better now than at any former period of our history. The skill and care which saves the weak child to the community, gives health and strength to the strong, and the physique of the whole is raised to a higher level. It is difficult to find direct evidence of this improvement, but some statistics of the stature and weight of factory children (where we might expect degeneracy if anywhere), recorded in 1833 and in 1873, show that the children of the latter period were a whole year in advance of the former—children of ten or eleven years of age in 1873 being as tall and heavy as those of eleven and twelve fifty years previously.

CHARLES ROBERTS

Bolton Row, Mayfair, November 11

IN a letter on the above subject in NATURE, vol. xxv. p. 8, Dr. W. B. Kesteven asks for information or opinions on the statement that English heads have diminished in size during the last twenty-five or thirty years. My own opinion is that this is really the case. On the cause of this diminution I am not at present prepared to give a decided opinion. In the course of some investigations on heredity, commenced many years ago, I discovered that in some instances the average size of the heads of the sons and daughters was less than the average of those of the two parents. In each case the former had arrived at maturity before the comparison was made, and in every instance the children had had the advantage of a much larger amount of intellectual training than the parents had enjoyed. This discovery, so contrary to all the generally accepted opinions, surprised me considerably, and caused me to make inquiries from one of the leading hat-makers in this city as to what had been his experience in the increase or diminution in the sizes of hats sold. The facts furnished to me fully confirm the statements made in Dr. Kesteven's letter, and as the hat manufacturer to whom I refer has been more than forty-five years in the business he has had ample opportunity for collecting trustworthy information. From an article subsequently published by him in a trade journal (*Umbrella and Portmanteau Trades Review*, July, 1880) I take the following: "There is another feature in connection with heads which is singular in this district, and that is the decrease in sizes. It used to be considered sufficient to make one to each dozen; we now make, on an average, three or four of these sizes, which we are now obliged to keep in stock to meet our requirements. I allude to such sizes as 6½ and 6¾, which formerly were only necessary in boys' hats. This decrease in the size of heads has been going on for the last twenty-five years to my certain knowledge." In the letter appended to Dr. Kesteven's letter Prof. Flower asks the important question, "Does it [the statement] refer to any particular class of men, and does it refer to the same class of men?" In answer to this I have to say that the classes to which the figures in my quotation refer are, and have always been, much the same, namely, the upper and middle classes; and the individuals included in these two classes have had as much variety in their occupations as any large city, such as Manchester, can furnish. Another important question is also asked by Prof. Flower, namely, "May it (the decrease in the size of hat) not arise from some change of fashion, . . . such as hats being worn more on the top of the head than formerly." In some few instances this might possibly account for the difference, but in the majority of cases, and especially in those belonging to the dolichocephalic class of head, it will be found that it requires quite as large a size of hat when worn more on the back part

of the head as it does when worn on the top. The data already collected are probably not sufficient to base any settled opinion upon; but if more extended investigation should confirm the statements made above, it will then be a matter of some importance to us to endeavour to discover the cause of this diminution in the size of English heads. It will also be interesting to know if any such phenomenon has occurred in any other country.

Old Trafford, Manchester

CHARLES H. BLACKLEY

SURELY Mr. Hyde Clarke's arguments in favour of the hatters, statements are somewhat defective. Even if the survival of human weaklings be granted, it by no means follows that a being with a weakly body must needs have a small head. Indeed the exact converse is usually accepted; for big-chested athletes are generally supposed to be the men in possession of the smaller heads, and persons of weakly constitution the possessors of the larger heads. A weakly condition of body and health is often associated with great mental activity. Besides, at birth, the conditions, if favourable for the survival of weaklings, are surely equally favourable for the strong and well-made; under ordinary circumstances then these latter individuals should show an increase in the size of the head. It cannot be imagined that the weaklings are surviving at the expense of the strong and hearty, such a case would be, as some one has said, a survival of the unfittest. It would be interesting if Mr. Hyde Clarke would tell us something more about the "old standard" in ears, when he observed ears begin to fall below this old standard, and how the old standard in ears is to be recognised. My business as an artist has caused me to particularly notice heads and faces for many years past, and from ten to thirty portraits (old and new) pass through my hands every week. My opinion, founded on this experience, entirely agrees with the statements made by some of the speakers at the meeting of the Anthropological Institute mentioned by Mr. Clarke. The alleged diminution in size of men's heads is I think due to a misinterpretation on the part of the hatters of the fact that the hair is worn much shorter now than formerly, and the hat is now worn more on the crown of the head than in the past generation. The brim of the hat brought close down over the brows and the long hair in men is a very marked feature in old portraits.

W. G. SMITH

125, Grosvenor Road, Highbury, N.

I SHALL not enter into the question of the relative sizes of the heads of our generation and of that of our fathers or grandfathers, beyond stating my general agreement with the explanation suggested by Prof. Flower, viz. that we carry our hats perched on the top of our heads instead of bringing them down as they did over occiput and ears, and that many of us, myself included, wear what hair we have so short that brushes and combs become superfluities. But I must express my surprise at so eminent a reasoner and statistician as Dr. Hyde Clark giving his support to a notion that to every medical statistic seems a transparent fallacy—that a reduced infant mortality implies a deterioration of the race. If the deaths of children were owing solely to exposure to the elements, there might be a survival of the fittest, and such was the case among the Highlanders in former days, as it is perhaps still among Red Indians and the like; but we know that disease does not strike or weed out the feeble ones, or the people of Liverpool and Manchester, among whom 60 to 70 per cent. die before attaining their fifth year, ought to be a more stalwart race than the Scandinavians, who lose only about 16. No! infant mortality in civilised (?) and urban populations is due to two great causes, zymotic diseases and parental neglect, including insanitary surroundings. Now scarlatina, diphtheria, &c., do not show any preference, but cut off healthy and weakly alike; and improper food, foul air, overcrowding, bad drainage, though they may kill the feeble outright, tend to deteriorate the survivors; the weak die, the strong are made weak; those who do not die of scrofula, or diarrhoea, or rickets in infancy grow up puny or consumptive—"Mox duros progeniem vitiosorem." I maintain that just as each death registered represses two whole years of sickness, so each infant's life saved implies two who would have been feeble rendered healthy and valuable members of society. The opposite view would strike at the root of all sanitary reform.

76, Marquess Road, N.

EDWARD F. WILLOUGHBY

MCNOS ISLAND, TRINIDAD

THE following extract from the log of the R.Y.S. *Northumbria* has been sent us for publication by Dr. G. H. Kingsley; it is dated February 28, 1881:—